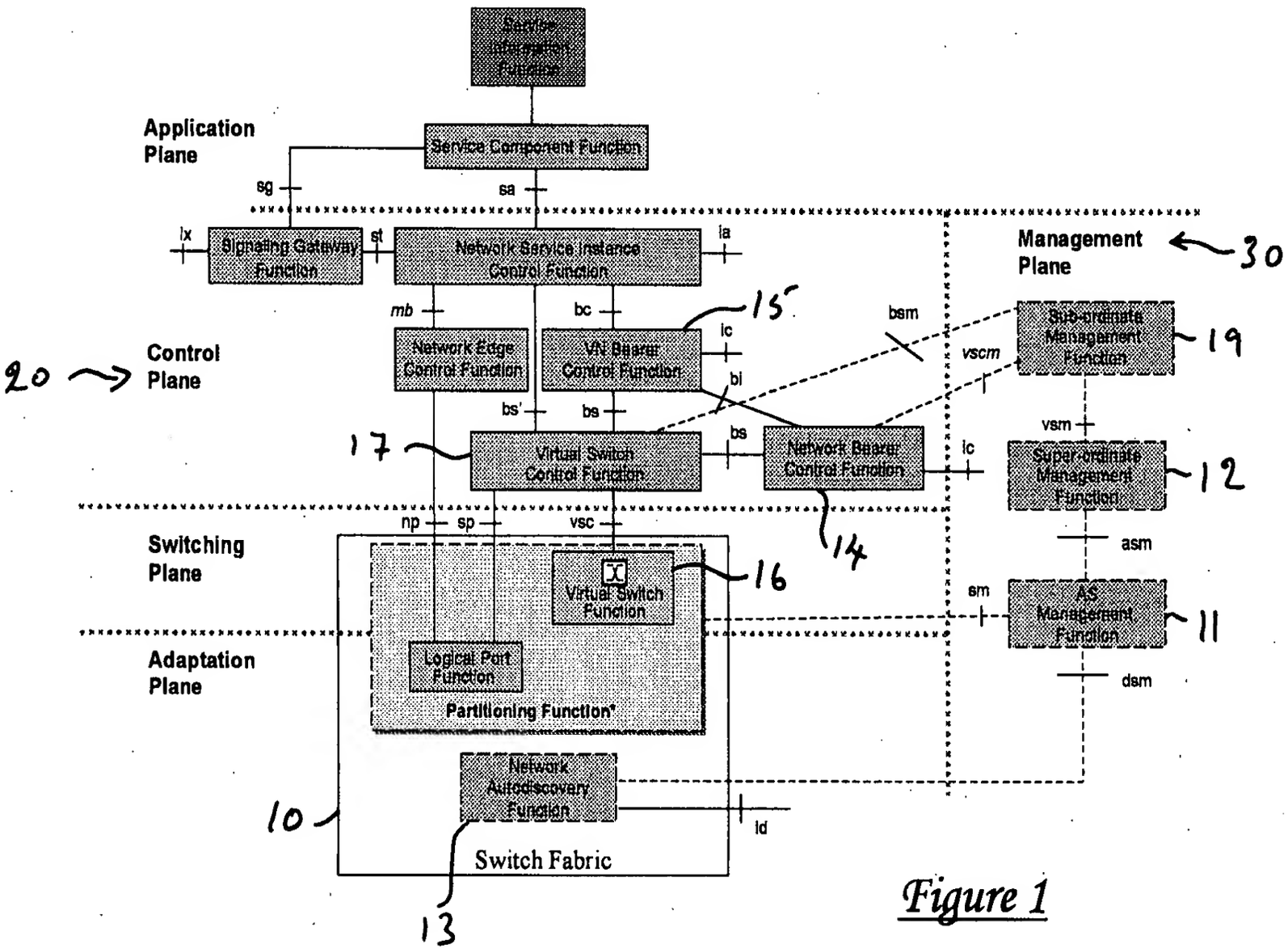

Service Information Function
Application Plane
Service Component Function
sg
sa
lx
Signaling Gateway Function
st
Network Service Instance Control Function
ia
Management Plane
30
mb
bc
15
Network Edge Control Function
VN Bearer Control Function
ic
bsm
Sub-ordinate Management Function
19
vscm
20
Control Plane
bi
bs'
bs
vsm
17
Virtual Switch Control Function
bs
Network Bearer Control Function
ic
Super-ordinate Management Function
12
14
np
sp
vsc
Switching Plane
asm
16
Virtual Switch Function
sm
AS Management Function
11
Adaptation Plane
Logical Port Function
Partitioning Function*
dsm
Network Autodiscovery Function
10
Id
Switch Fabric
13

Figure 1

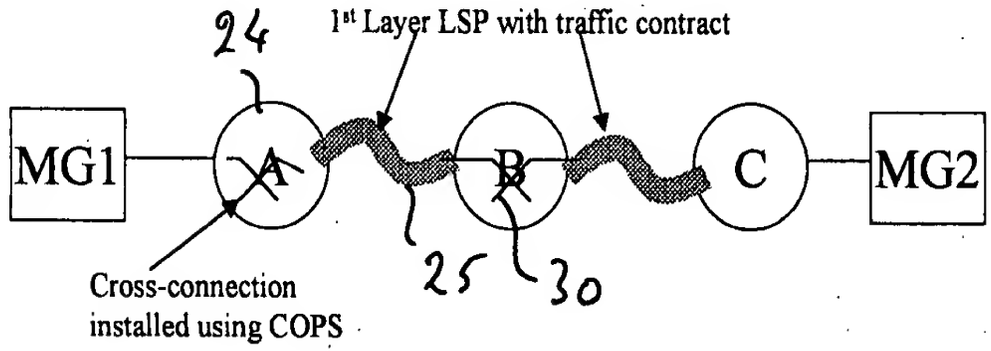


Figure 2A

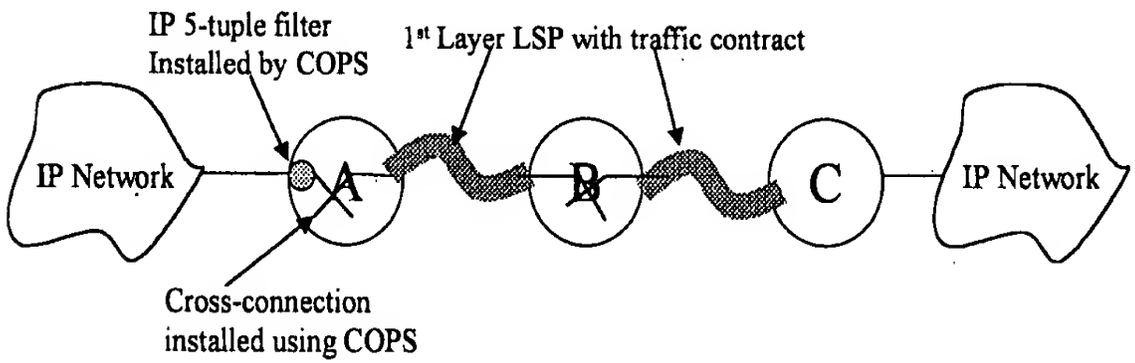


Figure 2B

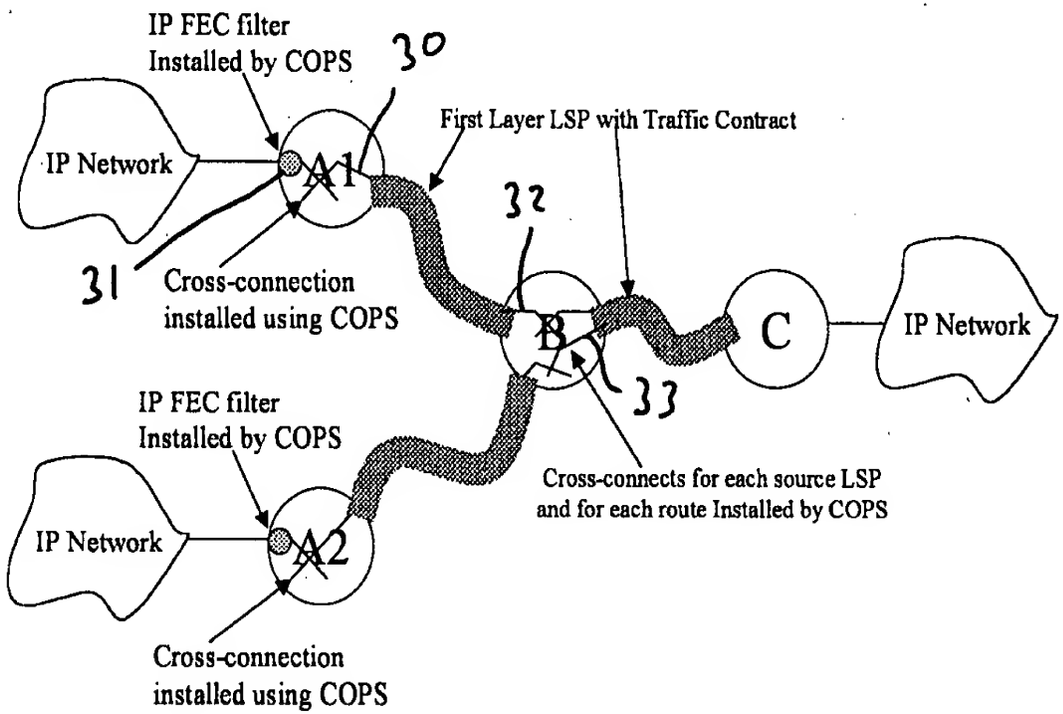

IP FEC filter
Installed by COPS
30
IP Network
A1
First Layer LSP with Traffic Contract
32
31
Cross-connection
installed using COPS
B
C
IP Network
33
IP FEC filter
Installed by COPS
Cross-connects for each source LSP
and for each route Installed by COPS
IP Network
A2
Cross-connection
installed using COPS

Figure 3

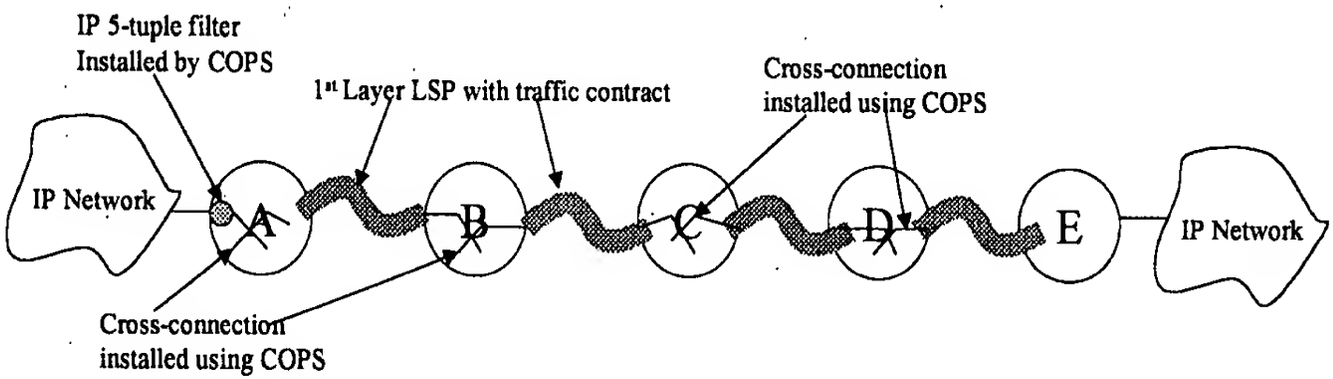
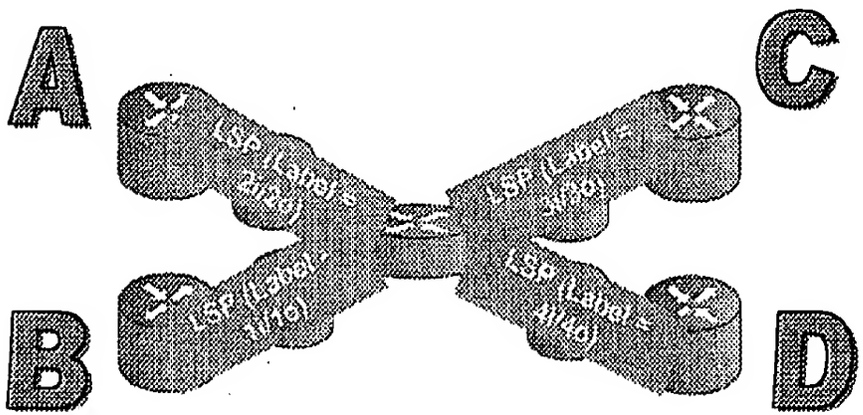

IP 5-tuple filter
Installed by COPS
1st Layer LSP with traffic contract
Cross-connection
installed using COPS
IP Network
A
B
C
D
E
IP Network
Cross-connection
installed using COPS

Figure 4



- Use the label assigned to an MPLS LSP as a vector quantity
- Use a stack of such labels to form a vector describing path across a network
- For paths across the illustrated network, the following label stacks would be used:
  - A to D → 2i<>2o/4i
  - B to C → 1i<>1o/3i
  - B to D → 1i<>1o/4i
- Per-LSP bandwidth monitoring permits accurate edge allocation of traffic to each path vector

Figure 5

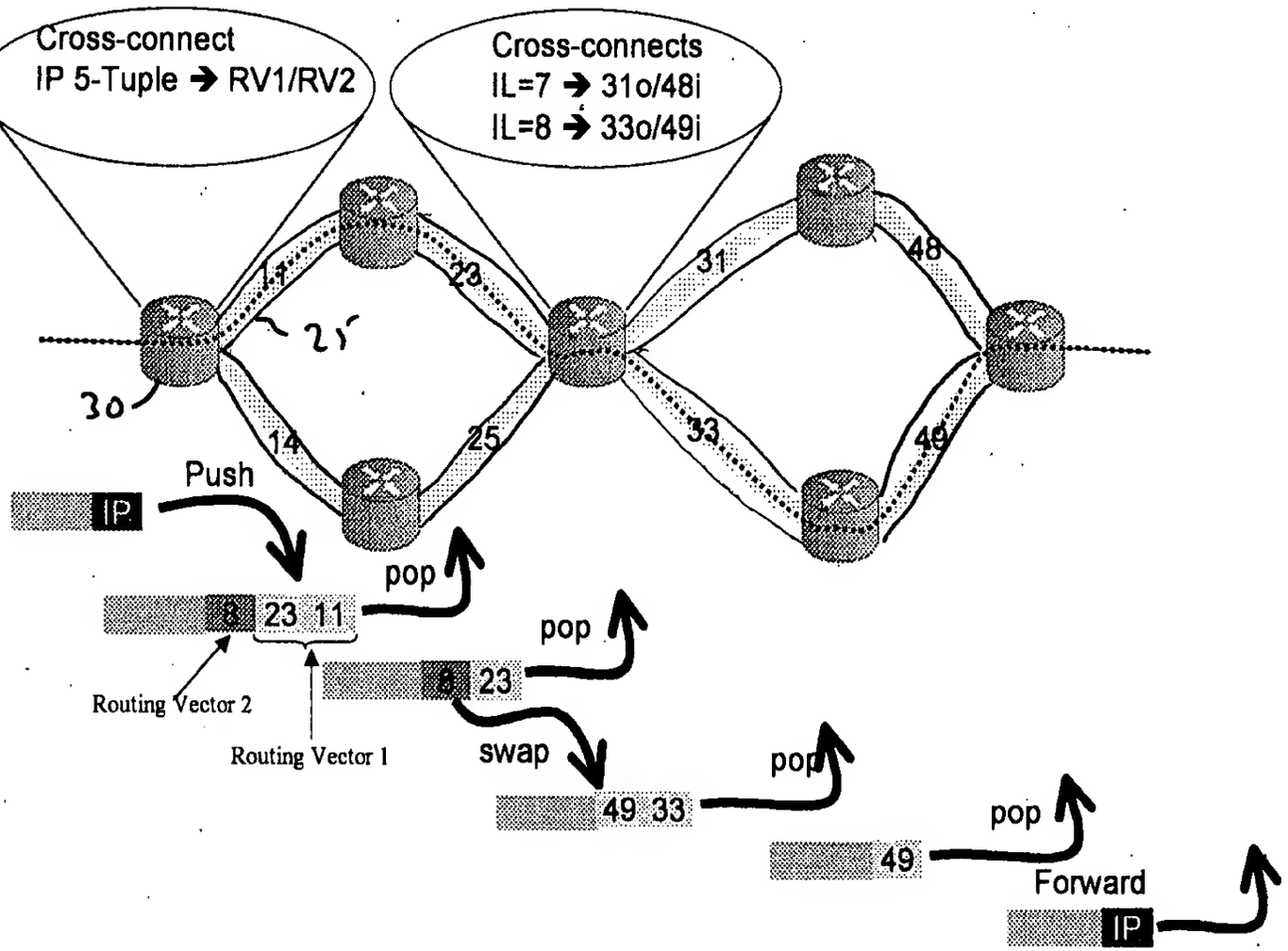

Cross-connect
IP 5-Tuple → RV1/RV2
Cross-connects
IL=7 → 31o/48i
IL=8 → 33o/49i
30
14
21
23
25
31
33
48
49
Push
IP
8 23 11
pop
8 23
pop
Routing Vector 2
Routing Vector 1
swap
49 33
pop
49
pop
Forward
IP

Figure 6

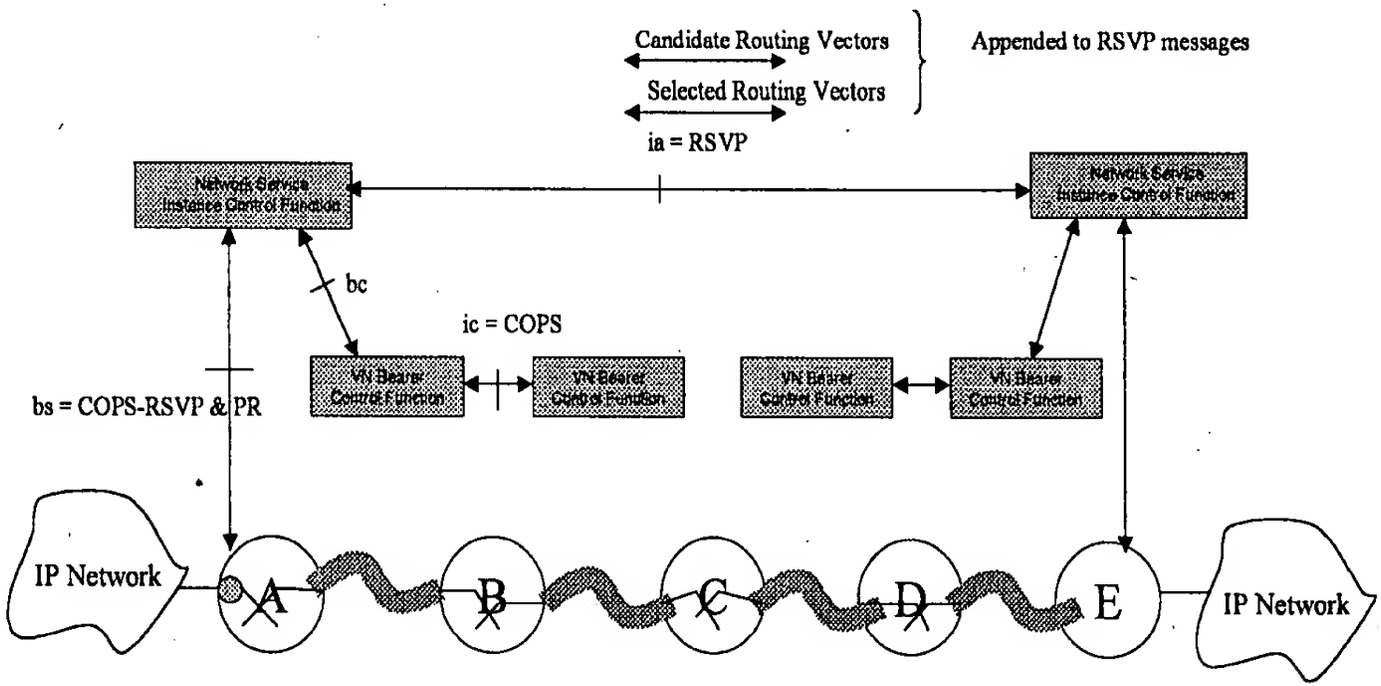

Candidate Routing Vectors
Selected Routing Vectors
Appended to RSVP messages
ia = RSVP
Network Service Instance Control Function
Network Service Instance Control Function
bc
ic = COPS
bs = COPS-RSVP & PR
VN Bearer Control Function
VN Bearer Control Function
VN Bearer Control Function
VN Bearer Control Function
IP Network
A
B
C
D
E
IP Network

Figure 8

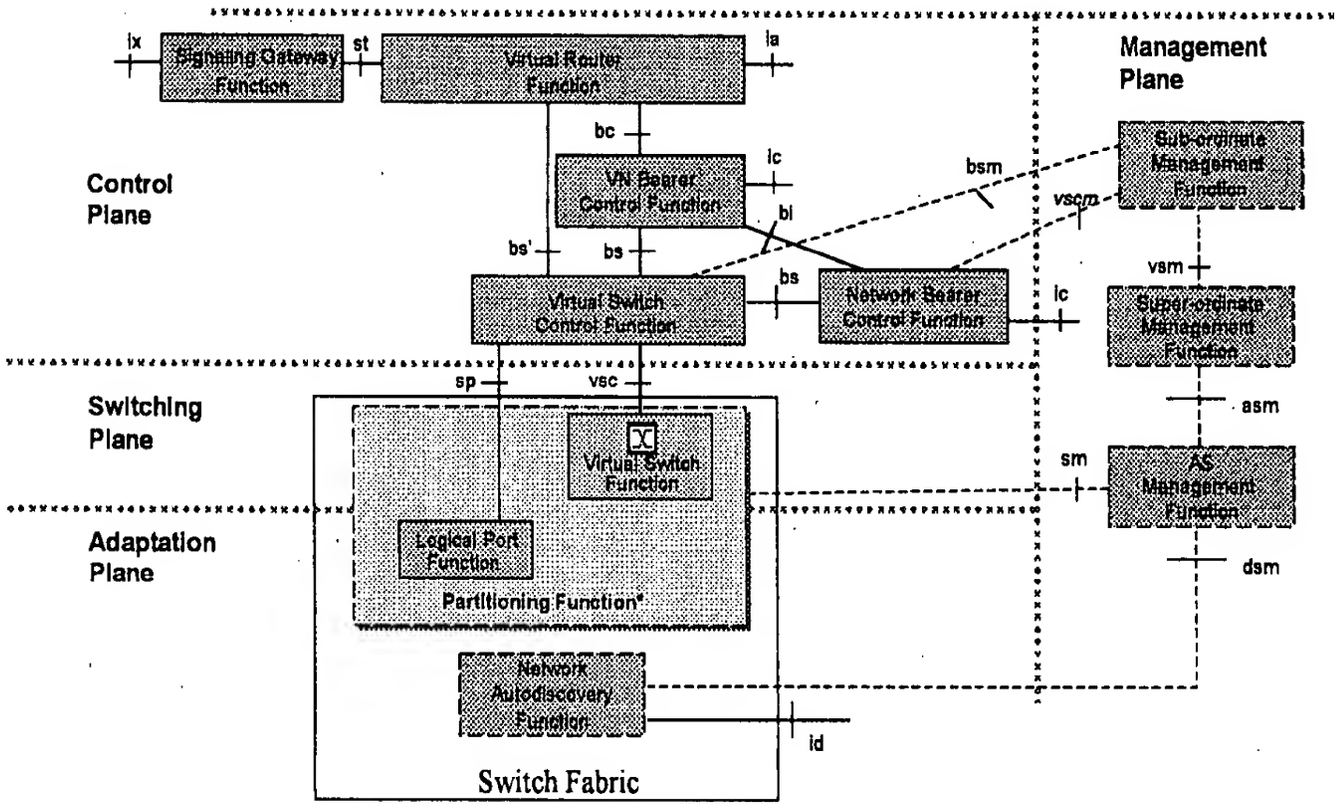

Ix
Signaling Gateway Function
st
Virtual Router Function
Ia
Management Plane
bc
Ic
VN Bearer Control Function
bsm
Sub-ordinate Management Function
vscm
bi
Control Plane
bs'
bs
vsm
bs
Network Bearer Control Function
Ic
Virtual Switch Control Function
Super-ordinate Management Function
sp
vsc
asm
Switching Plane
Virtual Switch Function
sm
AS Management Function
Logical Port Function
Adaptation Plane
dsm
Partitioning Function*
Network Autodiscovery Function
id
Switch Fabric

Figure 7

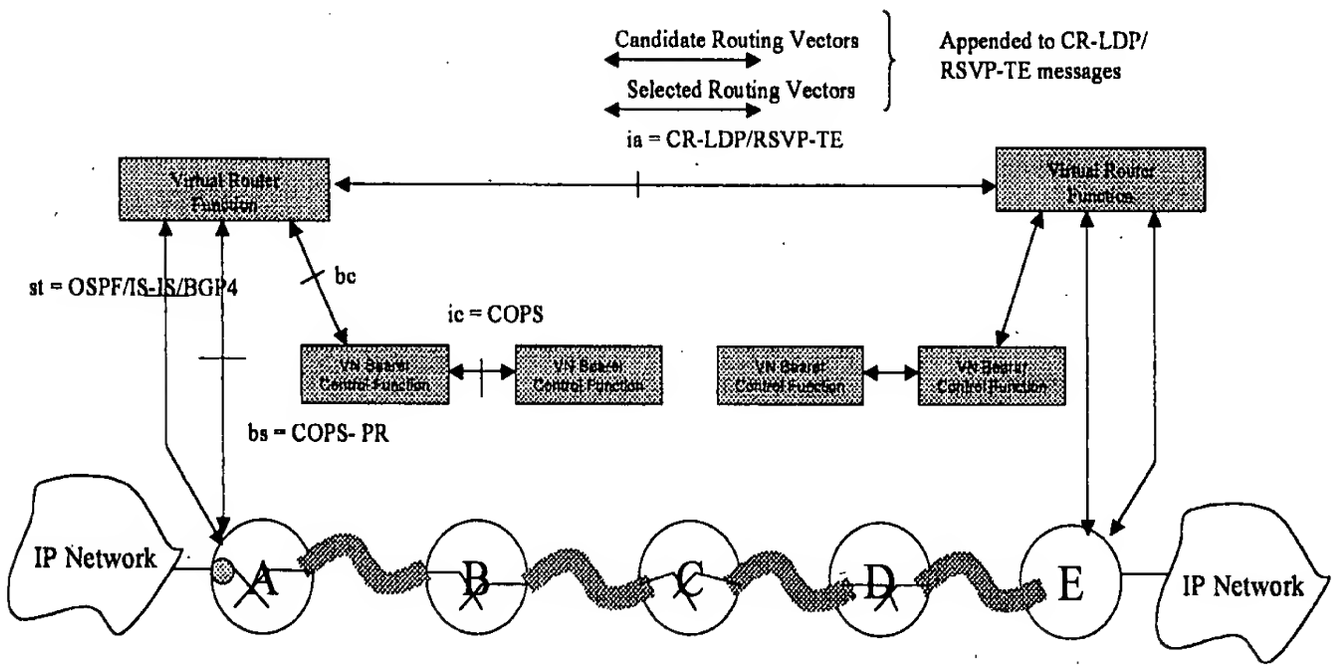

Candidate Routing Vectors
Selected Routing Vectors
Appended to CR-LDP/
RSVP-TE messages
ia = CR-LDP/RSVP-TE
Virtual Router Function
Virtual Router Function
st = OSPF/IS-IS/BGP4
bc
ic = COPS
VN Border Control Function
VN Border Control Function
VN Border Control Function
VN Border Control Function
bs = COPS- PR
IP Network
A
B
C
D
E
IP Network

Figure 9

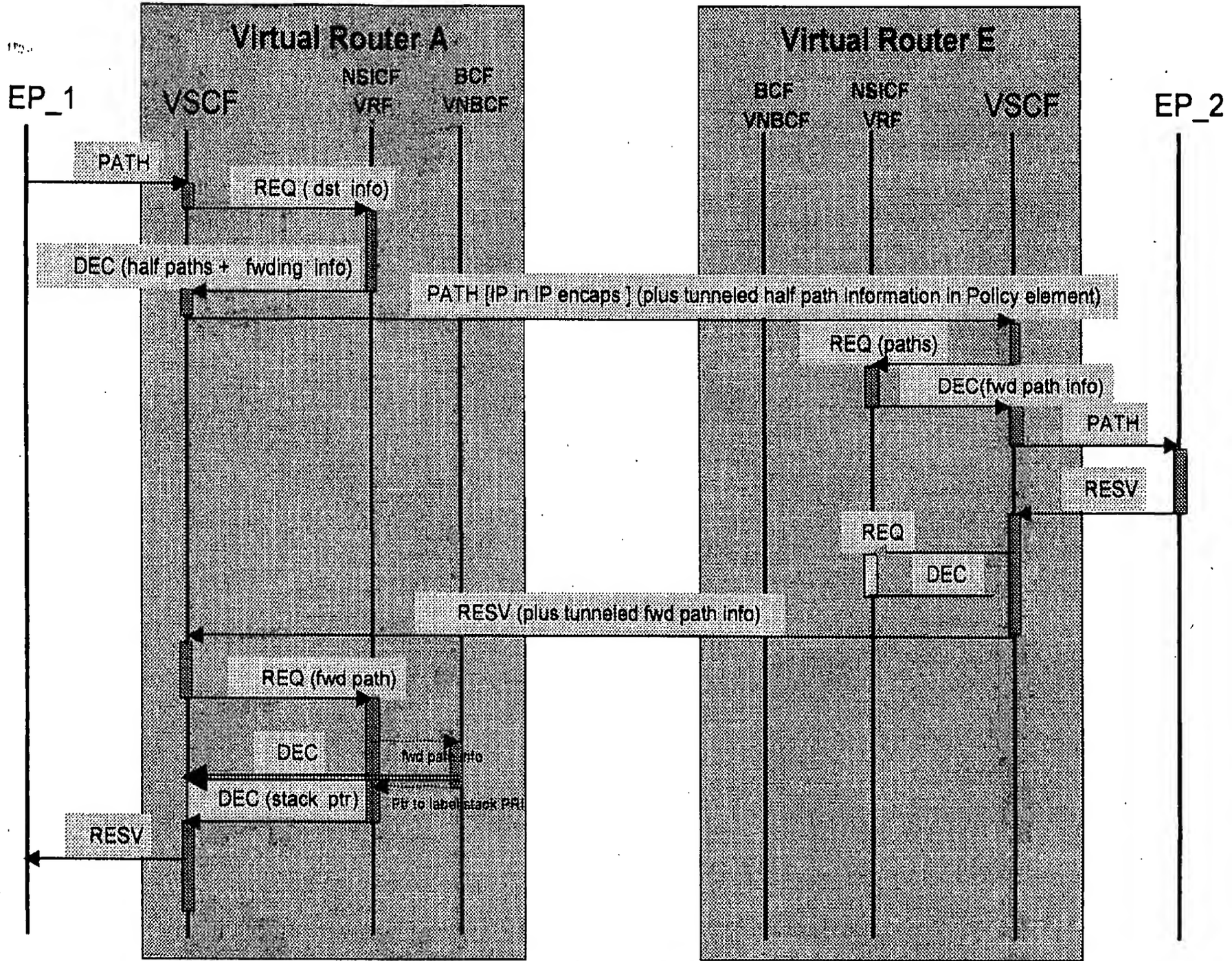

Virtual Router A
Virtual Router E
EP_1
EP_2
VSCF
NSICF
VRF
BCF
VNBCF
BCF
VNBCF
NSICF
VRF
VSCF
PATH
REQ (dst info)
DEC (half paths + fwding info)
PATH [IP in IP encaps] (plus tunneled half path information in Policy element)
REQ (paths)
DEC(fwd path info)
PATH
RESV
REQ
DEC
RESV (plus tunneled fwd path info)
REQ (fwd path)
DEC
fwd path info
DEC (stack ptr)
Ptr to label stack PRI
RESV

Figure 10

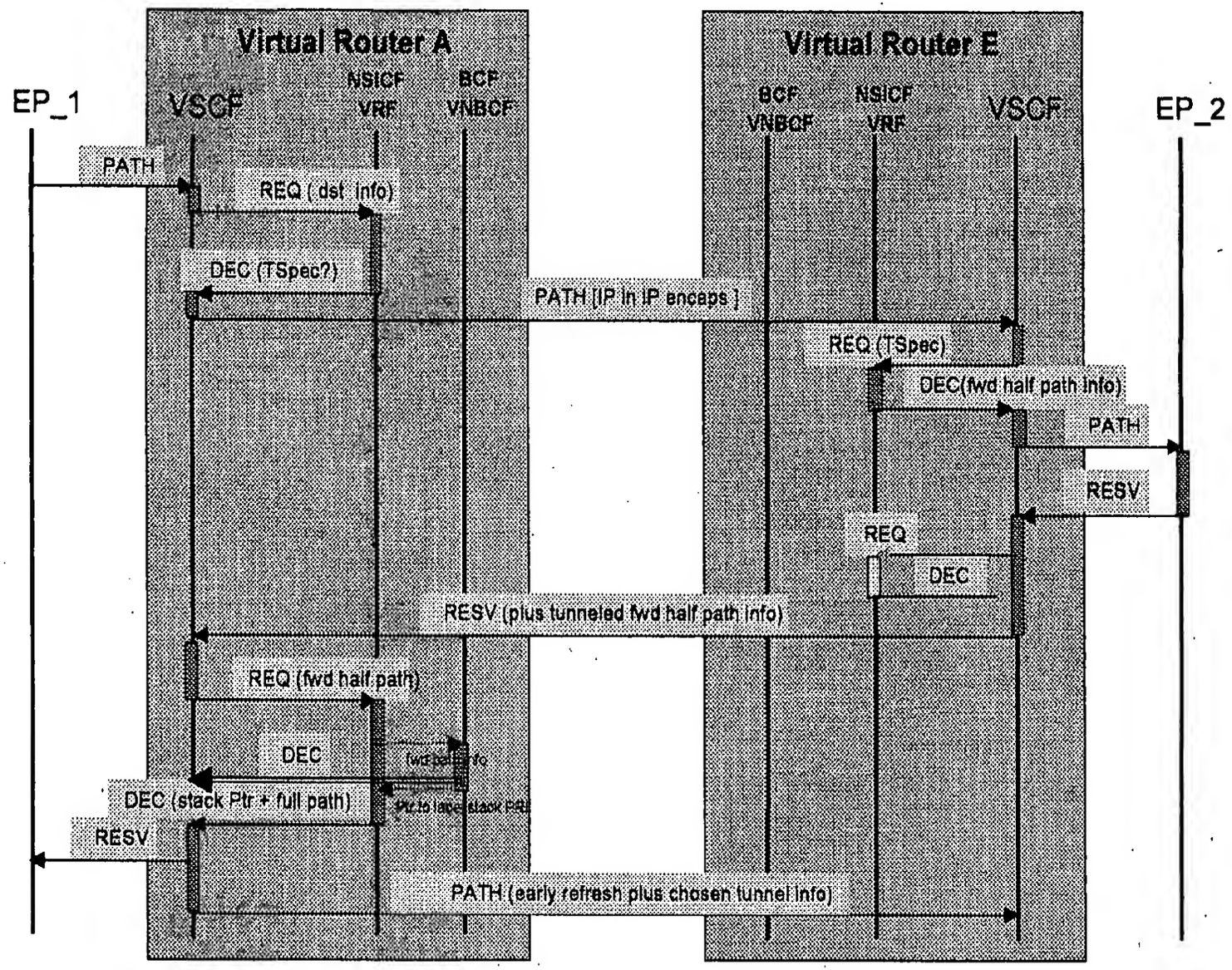

Virtual Router A
Virtual Router E
EP_1
VSCF
NSICF
VRF
BCF
VNBCF
BCF
VNBCF
NSICF
VRF
VSCF
EP_2
PATH
REQ (dst info)
DEC (TSpec?)
PATH [IP in IP encaps]
REQ (TSpec)
DEC(fwd half path info)
PATH
RESV
REQ
DEC
RESV (plus tunneled fwd half path info)
REQ (fwd half path)
DEC
DEC (stack Ptr + full path)
RESV
PATH (early refresh plus chosen tunnel info)

Figure 11